

Soaring--Honoring the contributions of Matilda White Riley

To the National Institutes of Health
“The Health and Behavior Lecture”

**Gender Differences in Heart Disease:
Let me Count the Ways**

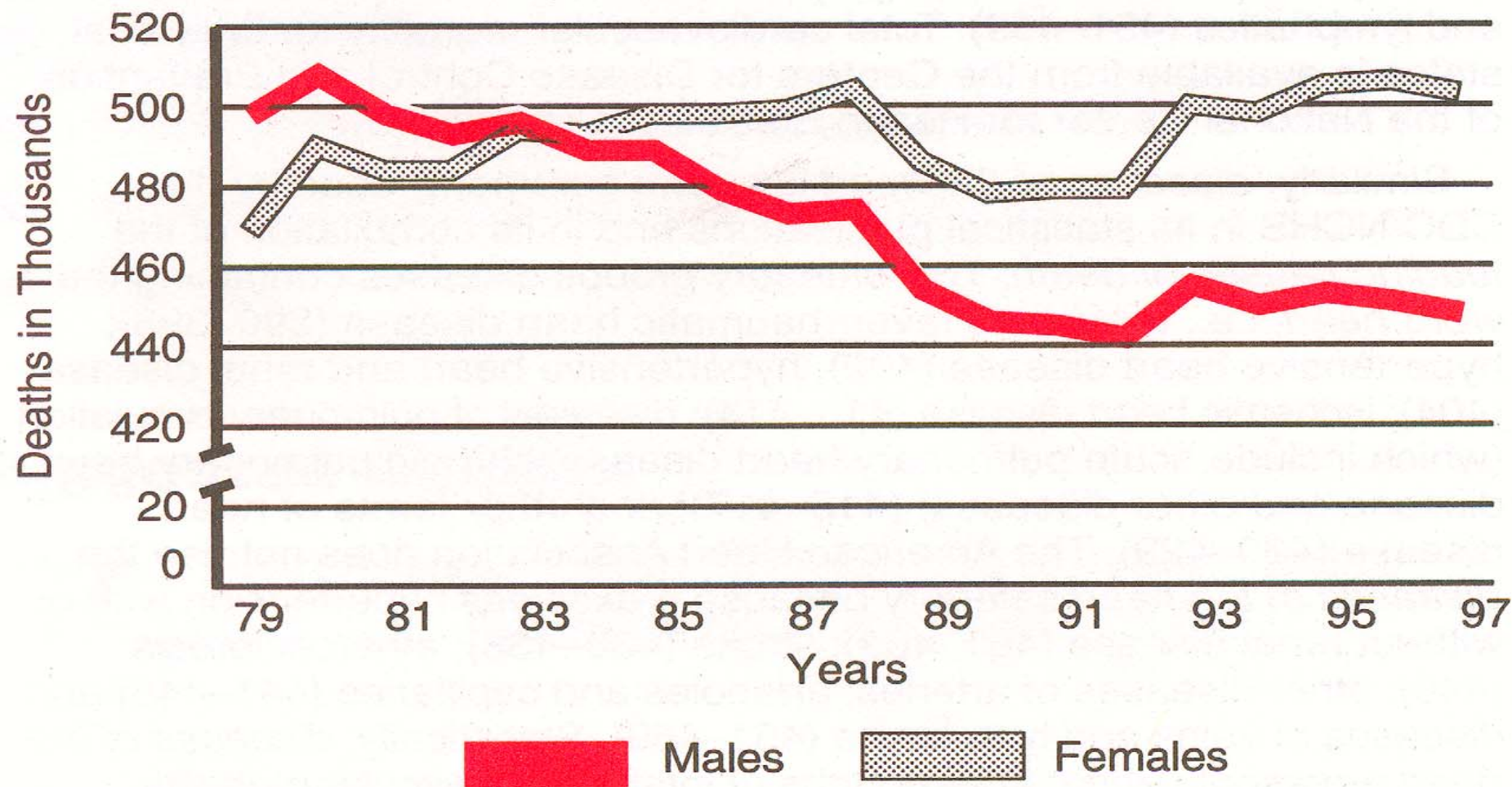
**Karen A. Matthews, Ph.D.
University of Pittsburgh**

“I have seen nearly a hundred people under this disorder (Angina) of which number there have been three women, and one boy 12 years old. All the rest were men near or past the 50th year of their age!”

William Heberden, 1768. Commentaries on the History and Cure of Diseases.

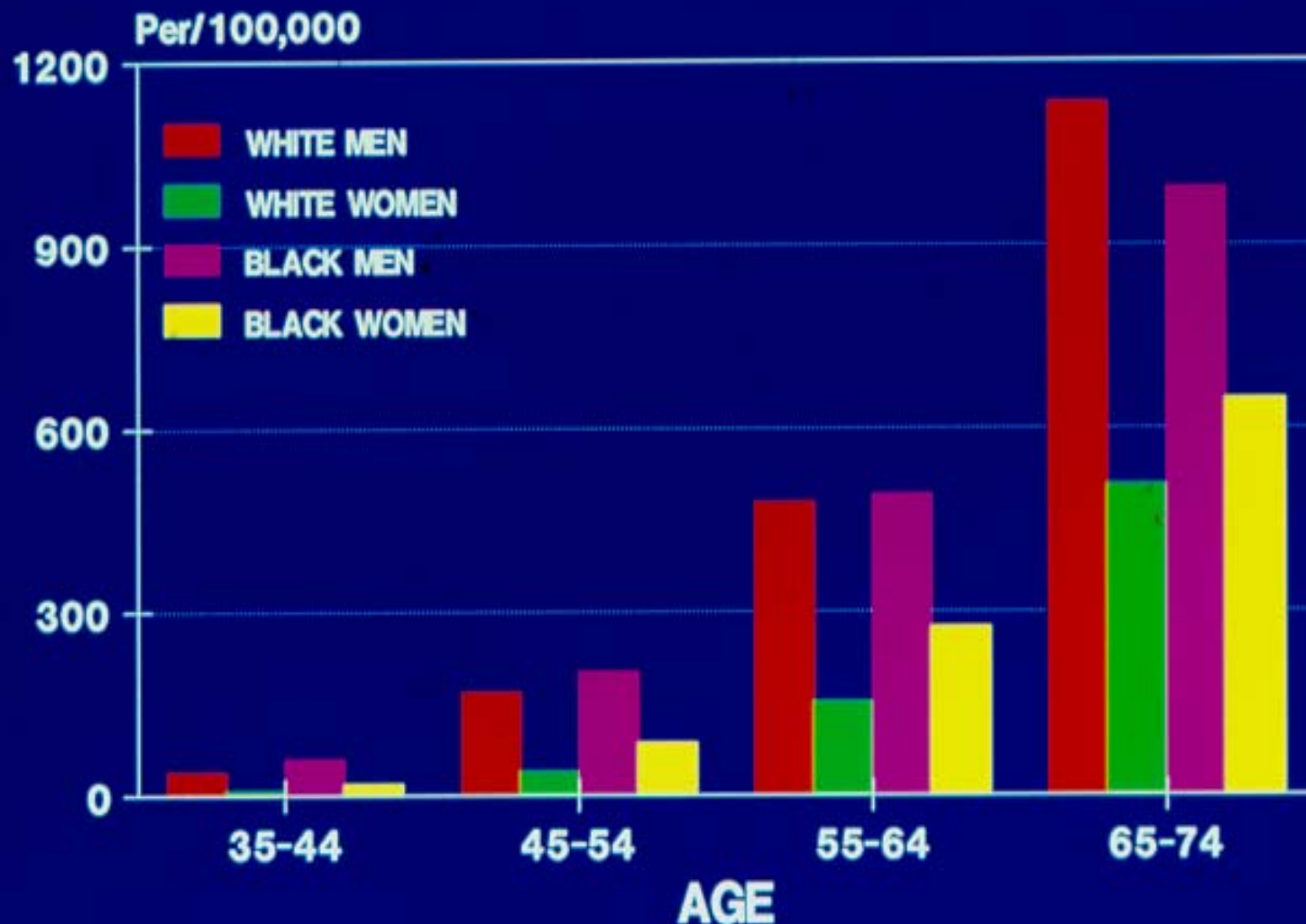
Cardiovascular Disease Mortality Trends for Males and Females

United States: 1979–97



Source: CDC/NCHS and the American Heart Association.

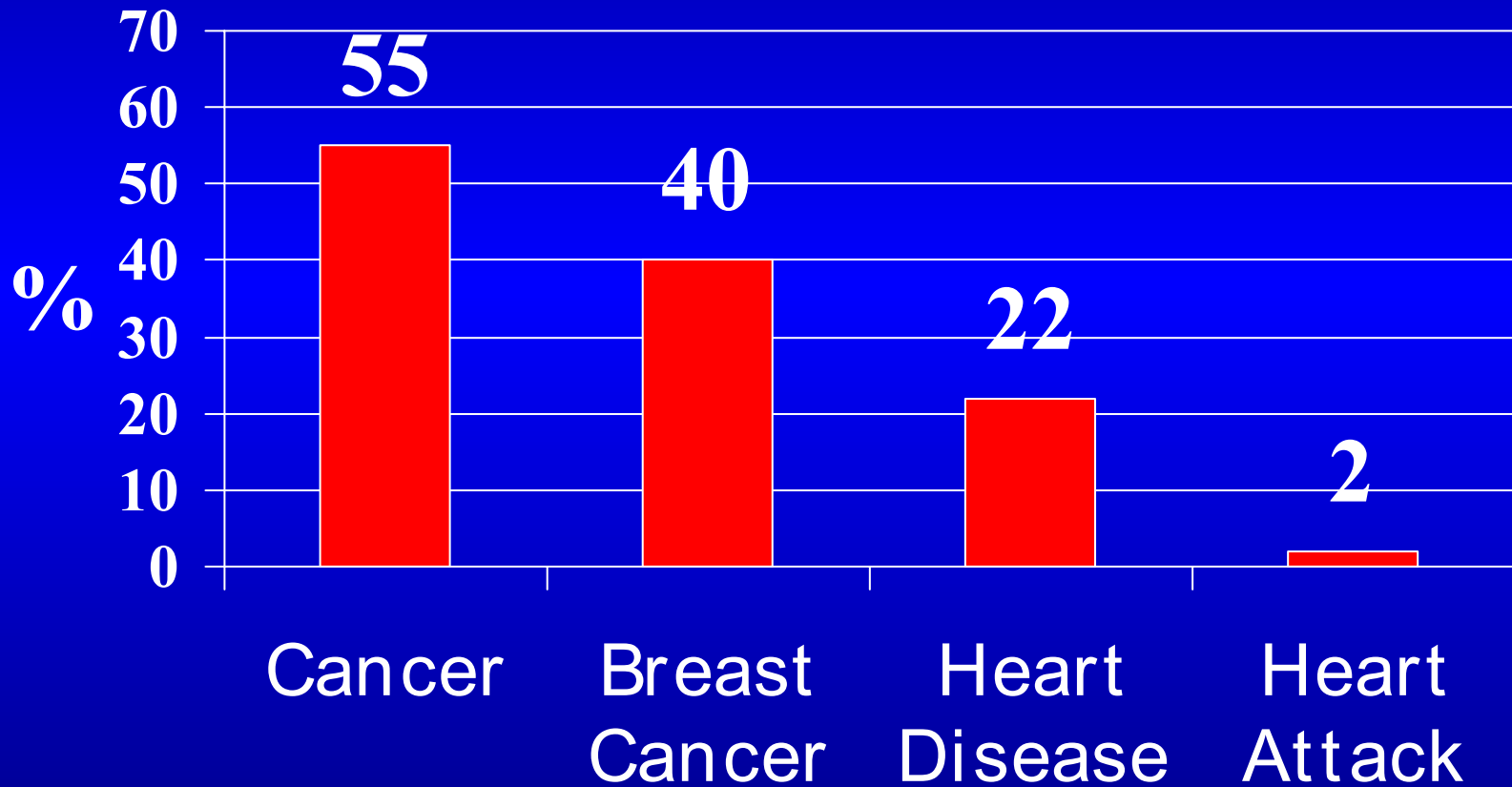
CHD (ICD 410-414) Mortality Rates by Race/Sex/Age, United States 1985



Cardiovascular Morbidity and Mortality United States 1988-1990

	Women	Men
Deaths	478,000	453,000
Hospitalizations	2.5 million	2.7 million
Physician office visits	32 million	25 million
Prevalence		
Hypertension	30 million	32 million
Heart disease	9.6 million	8.0 million
Population	127 million	121 million

Perceived Health Threats to Women



Source: Gallup Survey



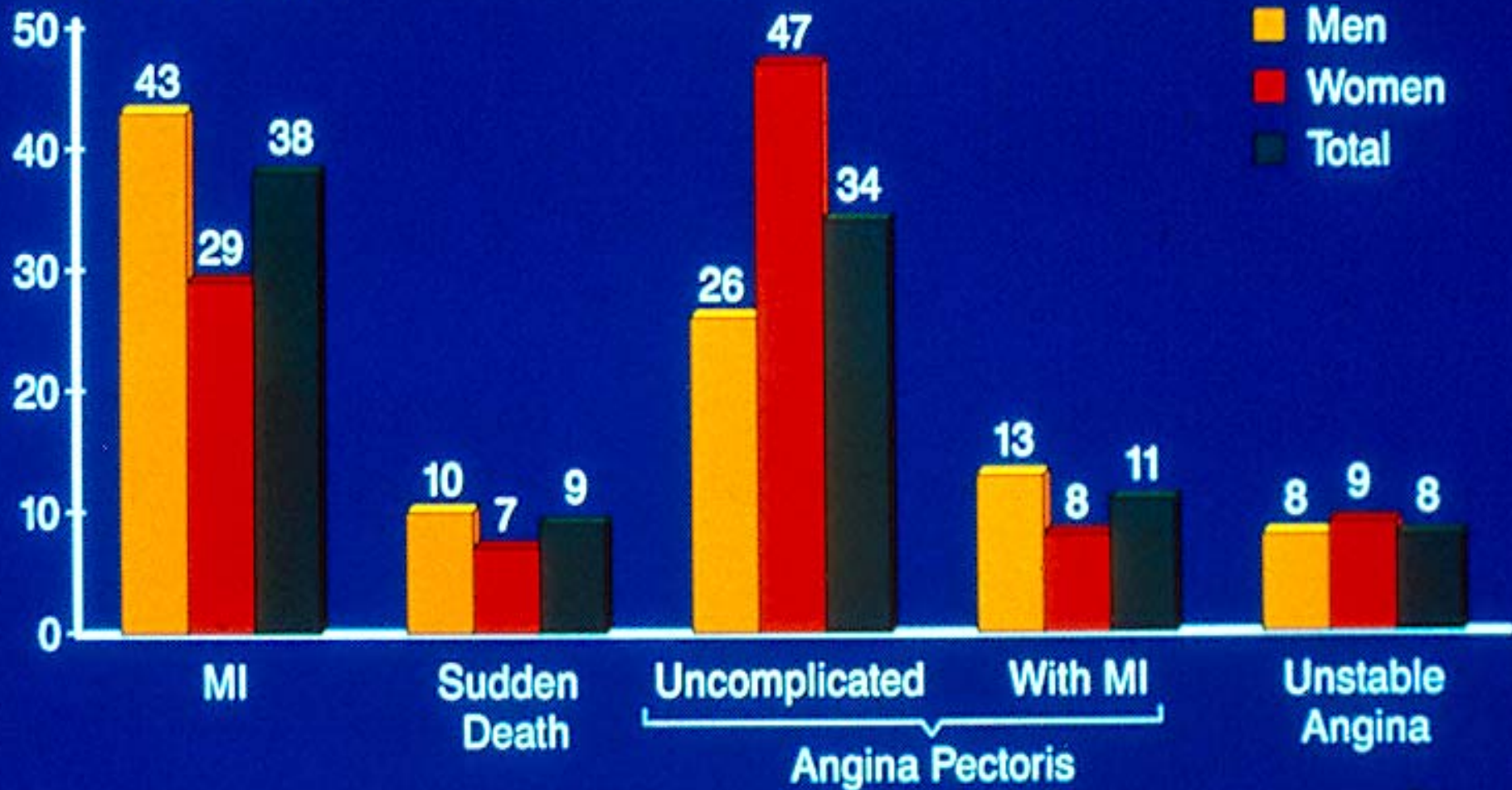
Annual Incidence of Cardiovascular Disease in the Framingham Heart Study: 30-Year Follow-up



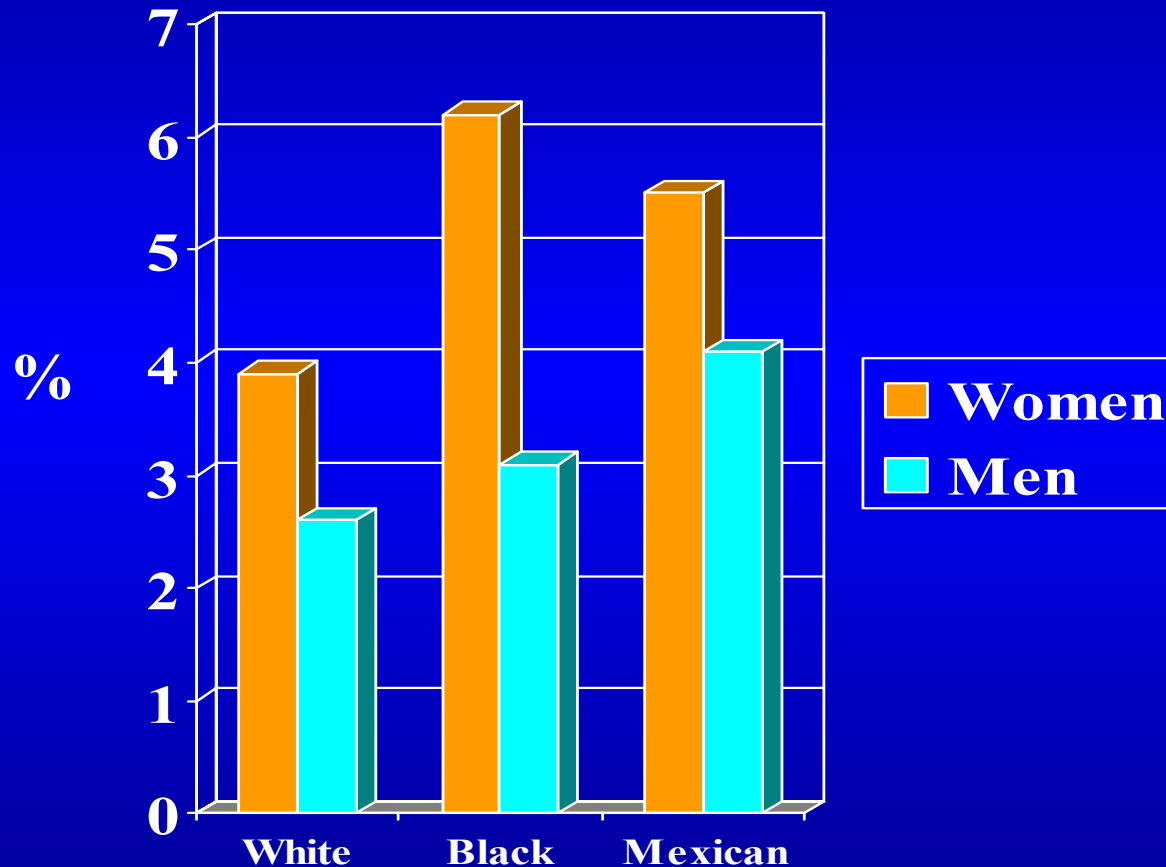
Gender Differences in Manifestations of CHD

Framingham Study's 26-Year Follow-up (Ages 35-84)

% of Total Events



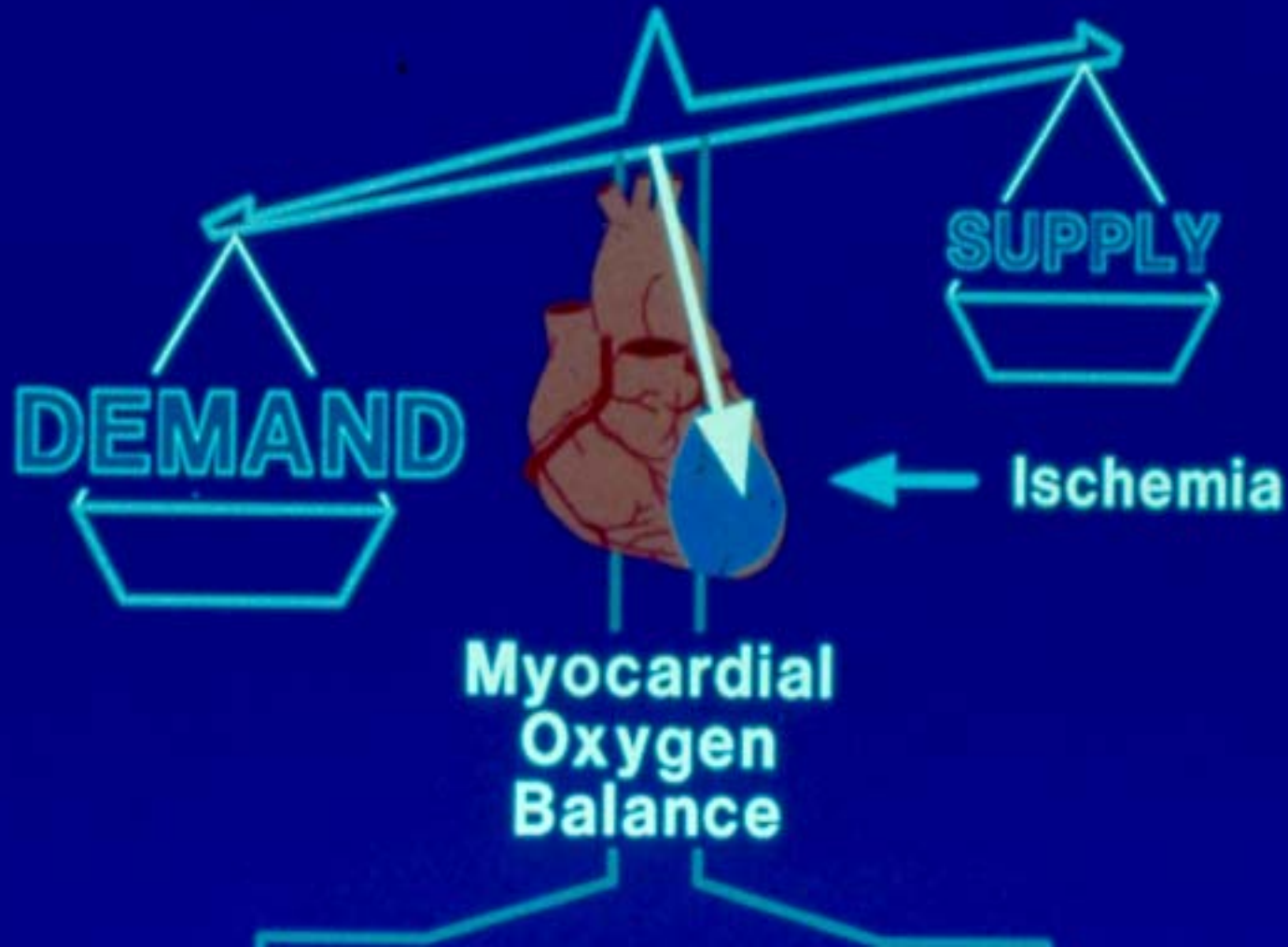
Age-adjusted Prevalence of Angina



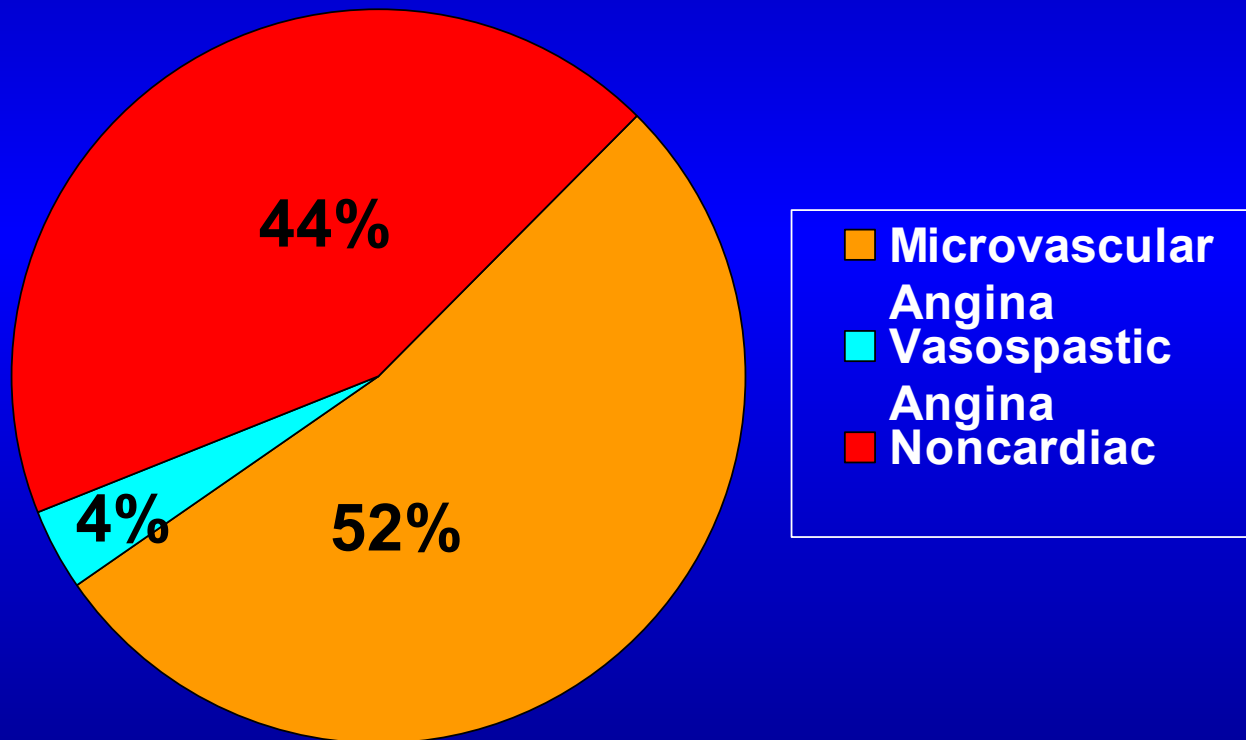
From NHANES III



Angina Pectoris is a Consequence of Myocardial Oxygen Demand Exceeding Myocardial Oxygen Supply



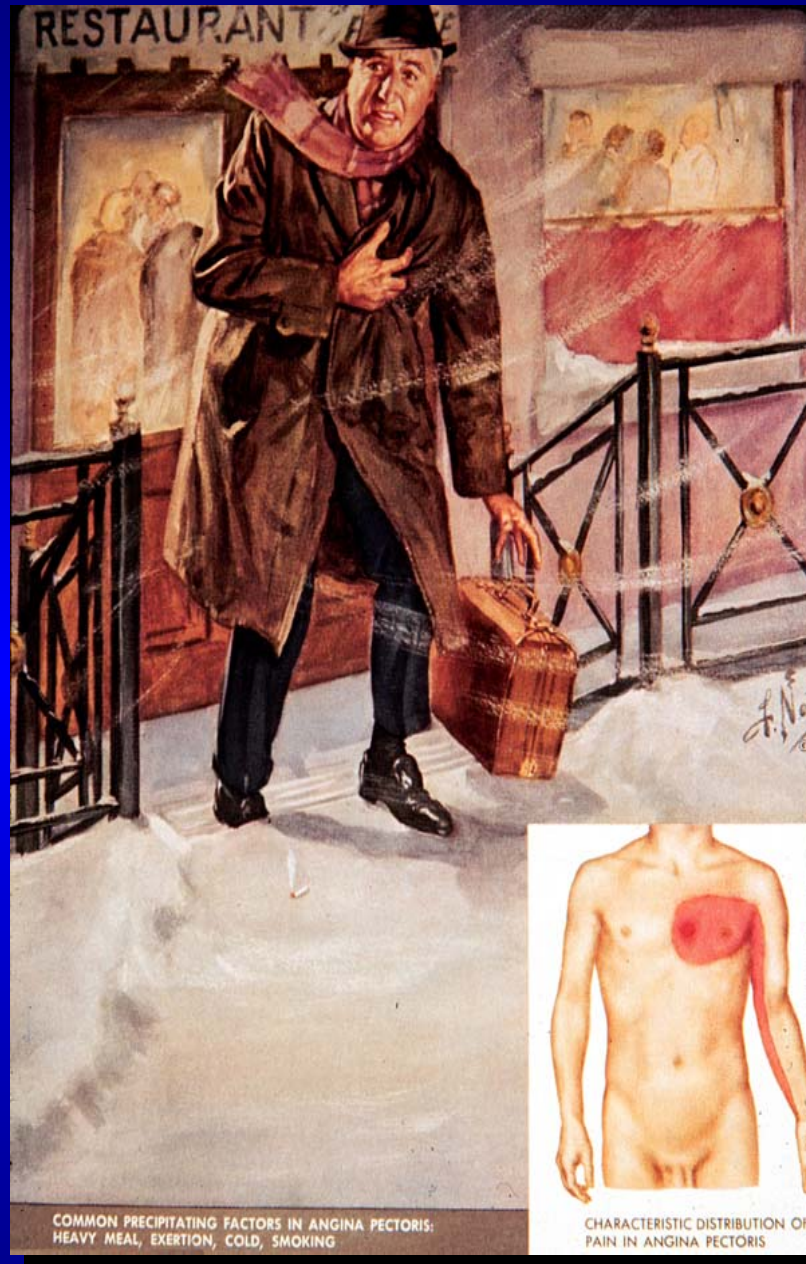
Mechanisms of Chest Pain: Women With “Normal” Coronaries



Microvascular Angina

- **Physiology**
 - Abnormal Coronary Flow Reserve
 - Inappropriate Dilation of Microvessels
- **Pathology**
 - Microvascular Endothelial Dysfunction
 - ????
- **Risk Factors**
 - Estrogen Loss, HTN, ↑ lipids





“They are seized with a painful and most disagreeable sensation in the breast, which seems as if it would extinguish life, if it were to increase or continue...pain sometimes reaches down the right arm, as well as to the left, even down to hands.”

William Heberden, 1768. Commentaries on the History and Cure of Diseases.

"I did not have chest pain. I had tiredness, like just out of breath. I had only been riding the bike maybe 5 or 6 minutes on a flat area. I was with a man and I ignored it. I thought I was having a panic attack"...

"It was very frightening. I began to tell the person I was with that I was having this. I thought, what are the symptoms?" (of a heart problem)... "And he said, 'I don't think you have heart problems. I had a male friend and here were his symptoms and you don't have them. You don't have chest pains.'"

Female CAD patient in Pittsburgh focus group

Mortality Differences Between Men and Women Following First MI-RESCATE

	Male	Female
28-d mortality*	8.3%	18.5%
6-mo mortality*	10.8	25.8
6-mo re-MI	3.9	5.0
6-mo readmit*	12.2	23.3

*P<.001

(Marrugat JAMA 1998;280:1405-9)



Percentage of Symptoms Attributed to Various Causes in Suspected Ischemic Patients by Sex and Results of Nuclear Scan

Cause	Men		Women	
	Normal (n=72)	Abnormal (n=151)	Normal (n=72)	Abnormal (n=40)
Cardiac	77.8	87.4	65.3	72.5
Somatic	16.7	9.3	20.8	15.0
Psychiatric	4.2	2.7	11.1	12.5
Other, noncardiac	1.4	0.7	2.8	0.0

Tobin et al. *Annals of Internal Medicine*, 107: 19-25, 1987.

CABS Operative Mortality Percentages

	Women	Men
CASS	4.5	1.9
Cleveland Clinic	2.9	1.3
Johns Hopkins	7.4	3.0
Cedars-Sinai	4.6	2.6

Expectation About Their Illness After Surgery (%)

	<u>Preoperative</u>		<u>Postoperative</u>	
	Men	Women	Men	Women
Always have it	36.2	26.6	28.4	31.4
Intermittent	5.3	5.3	6.8	10.5
Cured	53.2	43.6	42.0	29.1
Don't know	5.3	24.5	22.7	29.1

Quality of Life Prior to & 6 Months Following Surgery

	<u>Preoperative</u>		<u>Postoperative</u>	
	Men	Women	Men	Women
Overall good health	20.0	18.7	19.2	19.1
High vitality*^	13.6	11.7	16.7	15.3
Emotional problems cause role limitations*^+	2.5	2.0	2.5	2.5
Physical problems cause role limitations*^	2.1	1.3	3.0	2.5
Good physical functioning*^	24.9	21.2	26.3	23.9
Good social functioning*^	4.3	4.0	4.6	4.4

*p < .05, Main effect for Gender

^p < .05, Main effect for Time

+p < .05, Interaction of Gender X Time

Women vs. Men:

Women have different:

- **Mechanisms of Chest Pain**
- **Symptoms of Myocardial Ischemia**
- **Outcomes Following MI, PTCA, CABG**
- **Treatment by Physicians**



Clinical coronary events are a crude outcome.

- * Asymptomatic individuals have CAD.
- * Physician bias in diagnosis.
- * Race and gender differences in symptom presentation.

Subclinical CVD Measures

- *Coronary artery and aorta calcification measured by electron beam tomography
- *Intima media thickness and plaque in the common and internal carotid artery measured by B-mode ultrasound
- *Brachial artery vasodilation in response to reactive hyperemia measured by B-mode ultrasound

Validity of Subclinical CVD Measures

- * Coronary calcification correlated with CAD in pathology and angiography studies (Rumberger et al. Circulation, 1995).
- * IMT and plaque in carotid arteries predict CHD incidence (Chambless et al. Am J Epidemiol, 1997).
- * Impairment of flow-mediated brachial artery vasodilation associated with lesions in the carotid and coronary arteries (Celermajer et al. Circulation, 1992).

FRIDAY

10

JUNE

MAY						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JULY						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

- APPOINTMENTS -

8:00

See the boss - EARLY!!

8:30

9:00

9:30

10:00

Tom Leckey - at his office

10:30

Sales meeting - be firm

11:00

Schedule deliveries (RUSH)

11:30

12:00

~~Lunch - Harvey~~

1:00

1:30

Get out some order

2:00

no matter WHAT!!

2:30

3:00

Hurry on the Smith contract

3:30

WHAT'S HOLDING

4:00

THINGS UP?!

4:30

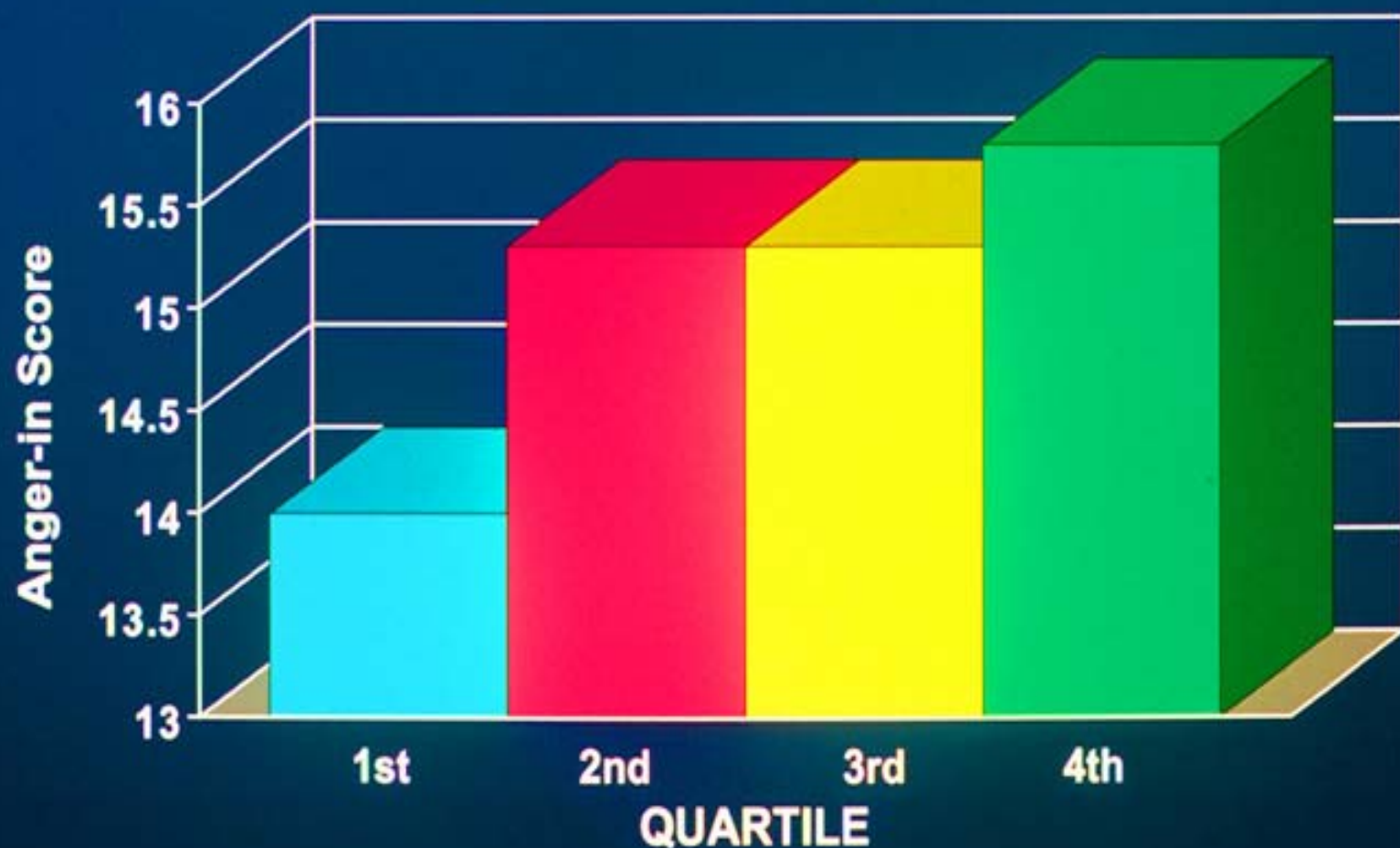
5:00

See Blake - PROMPT

5:30

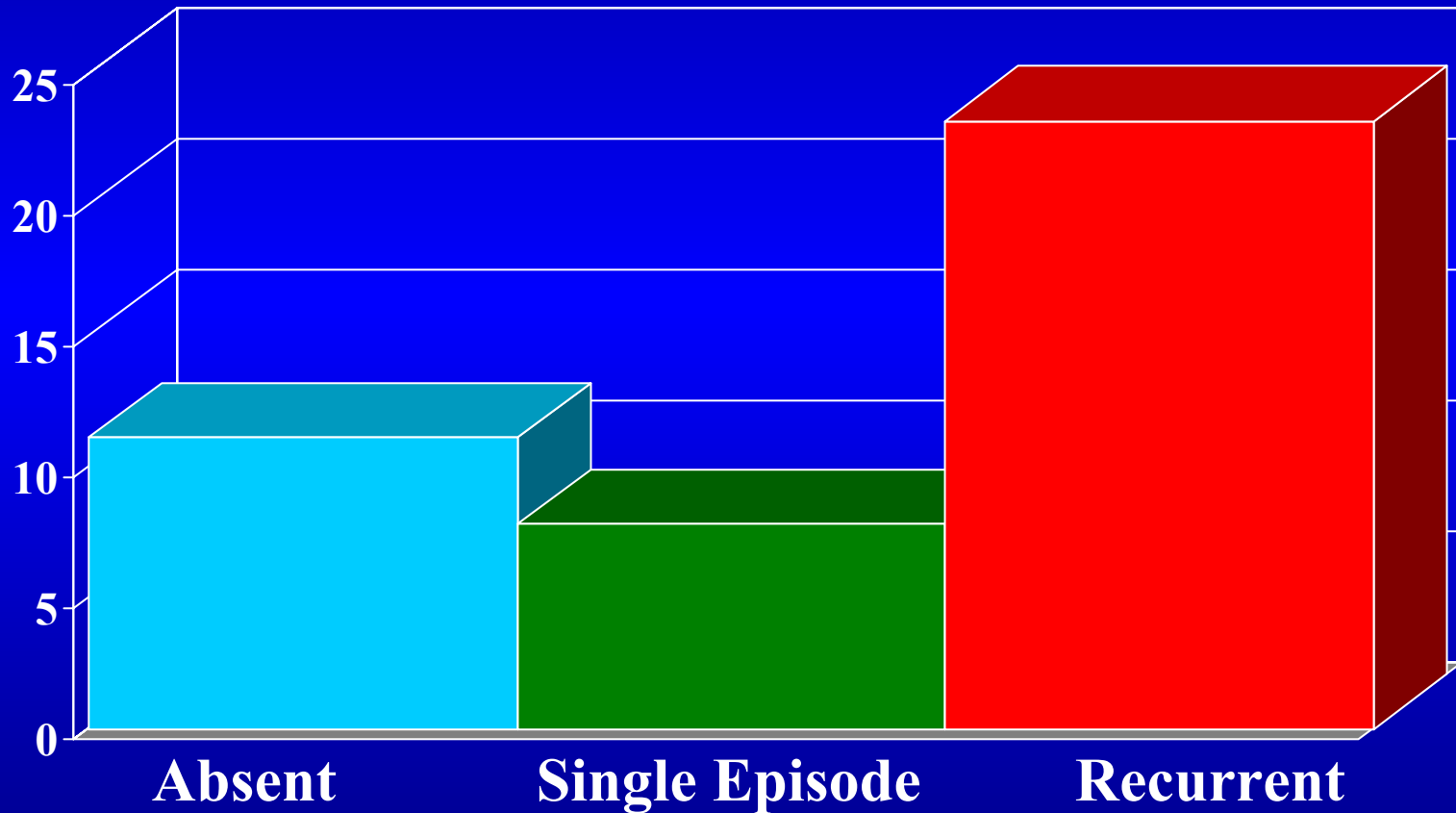
Catch 5:43 - PTA meets tonight

Relation Between IMT and Anger-in in Healthy Postmenopausal Women



Matthews, Owens, Kuller, Sutton-Tyrrell, & Jansen-McWilliams, 1997.

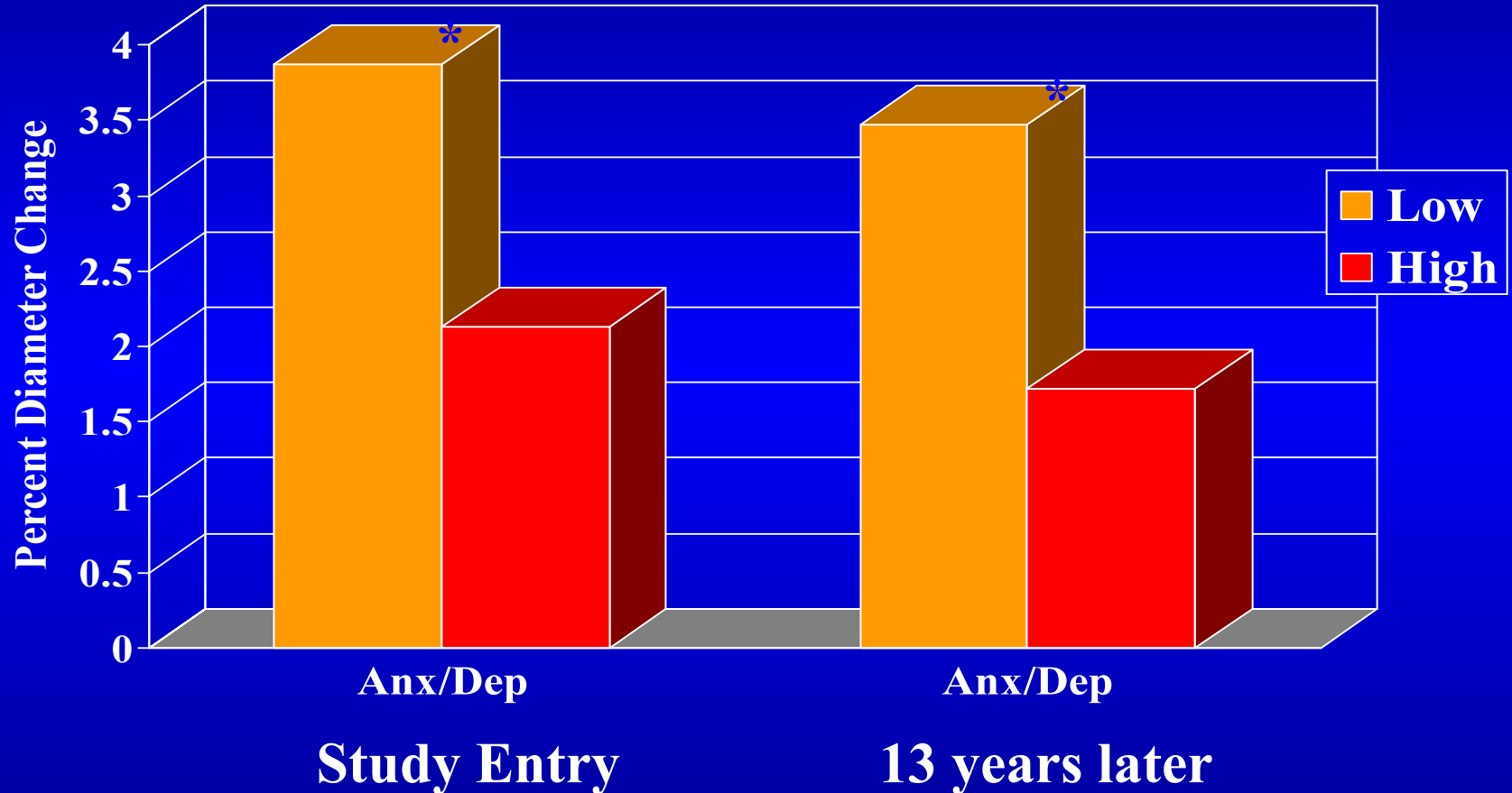
Percentage of SWAN Women With Carotid Artery Plaque According to History of Major Depression



$p < .05$

Jones, Matthews, et al. 2001.

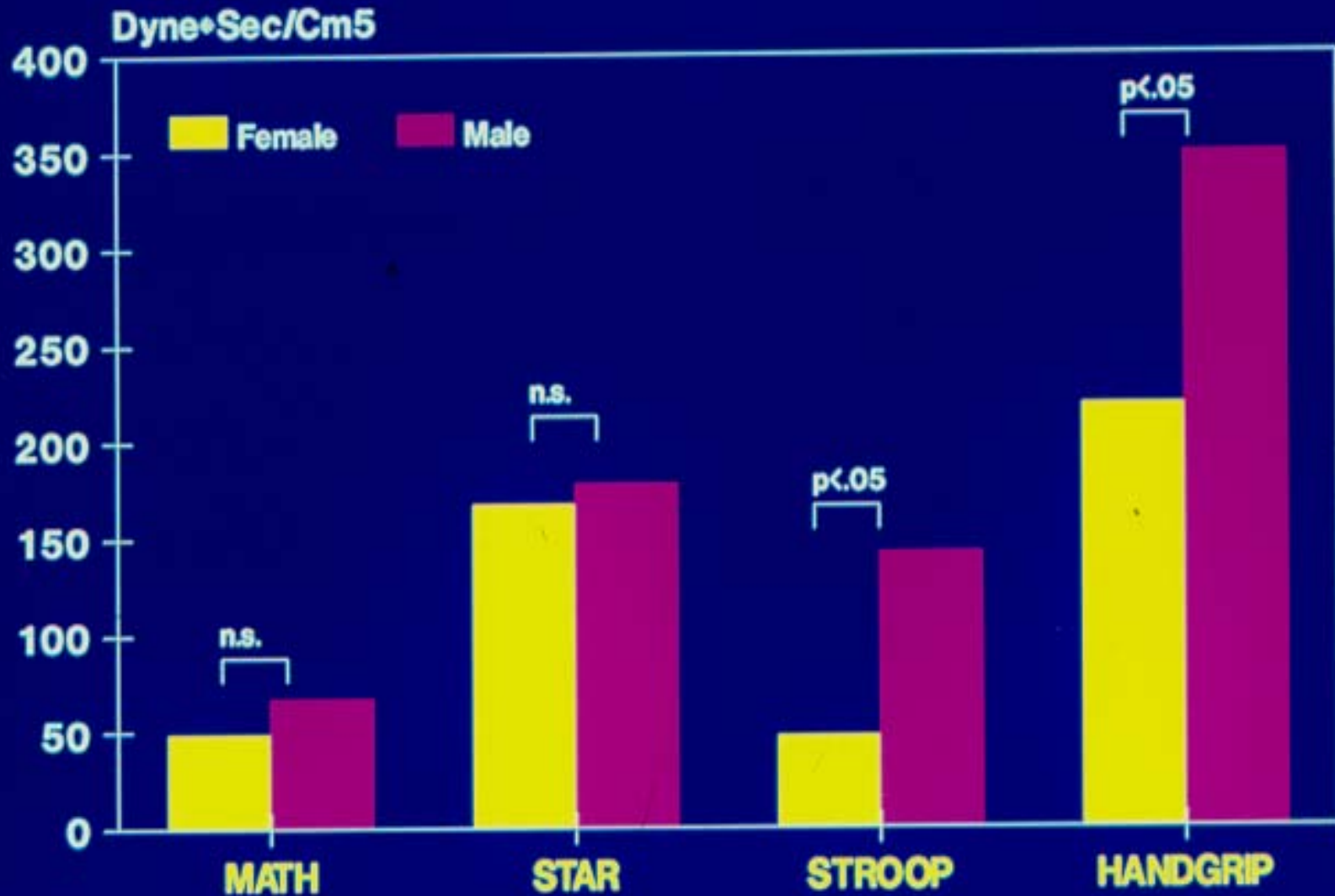
Diameter change by psychosocial factor scores in HWS



$*p < .05$

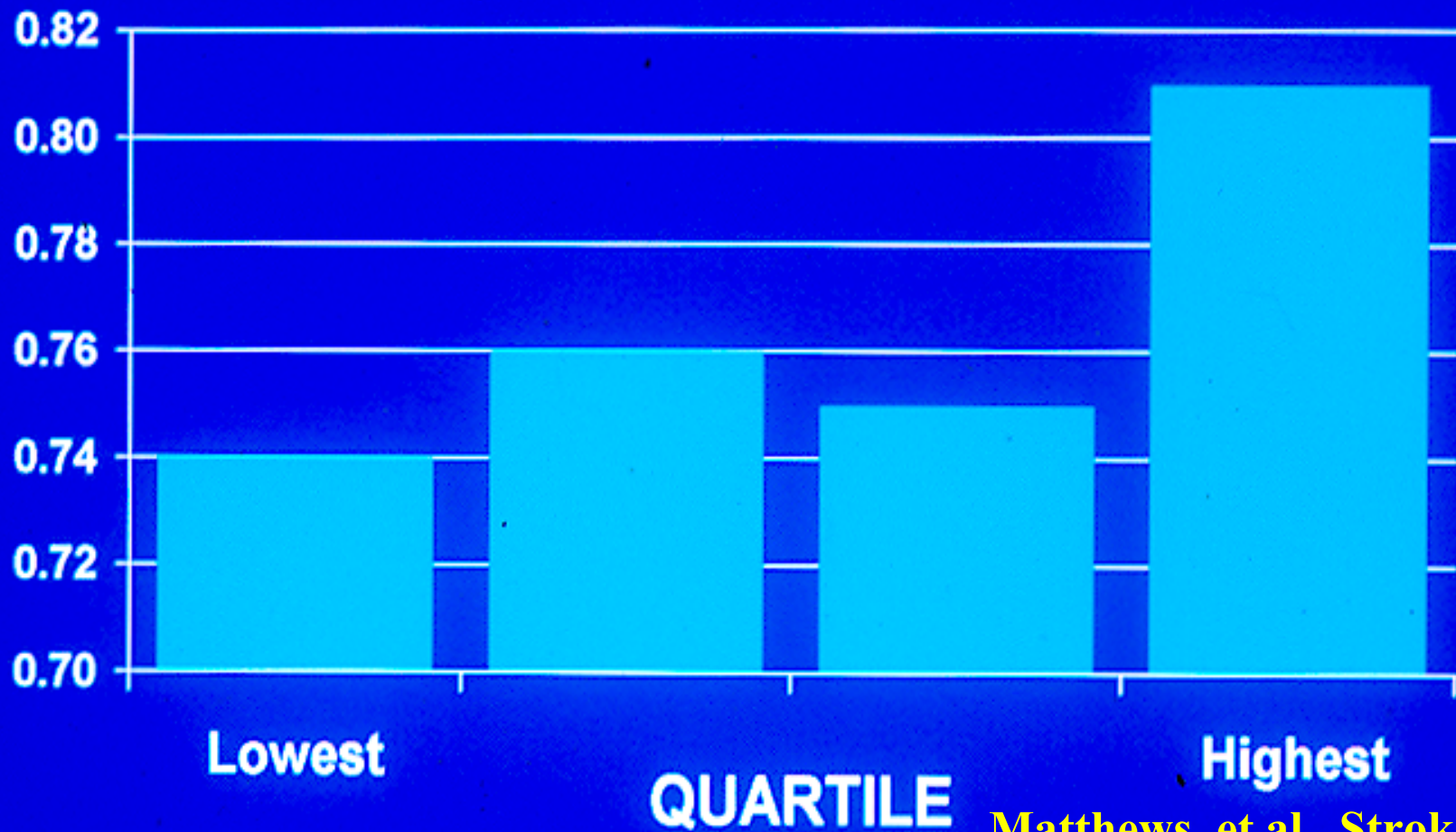
Harris, Matthews, et al. 2001.

TPR CHANGE SCORES FEMALES VS. MALES



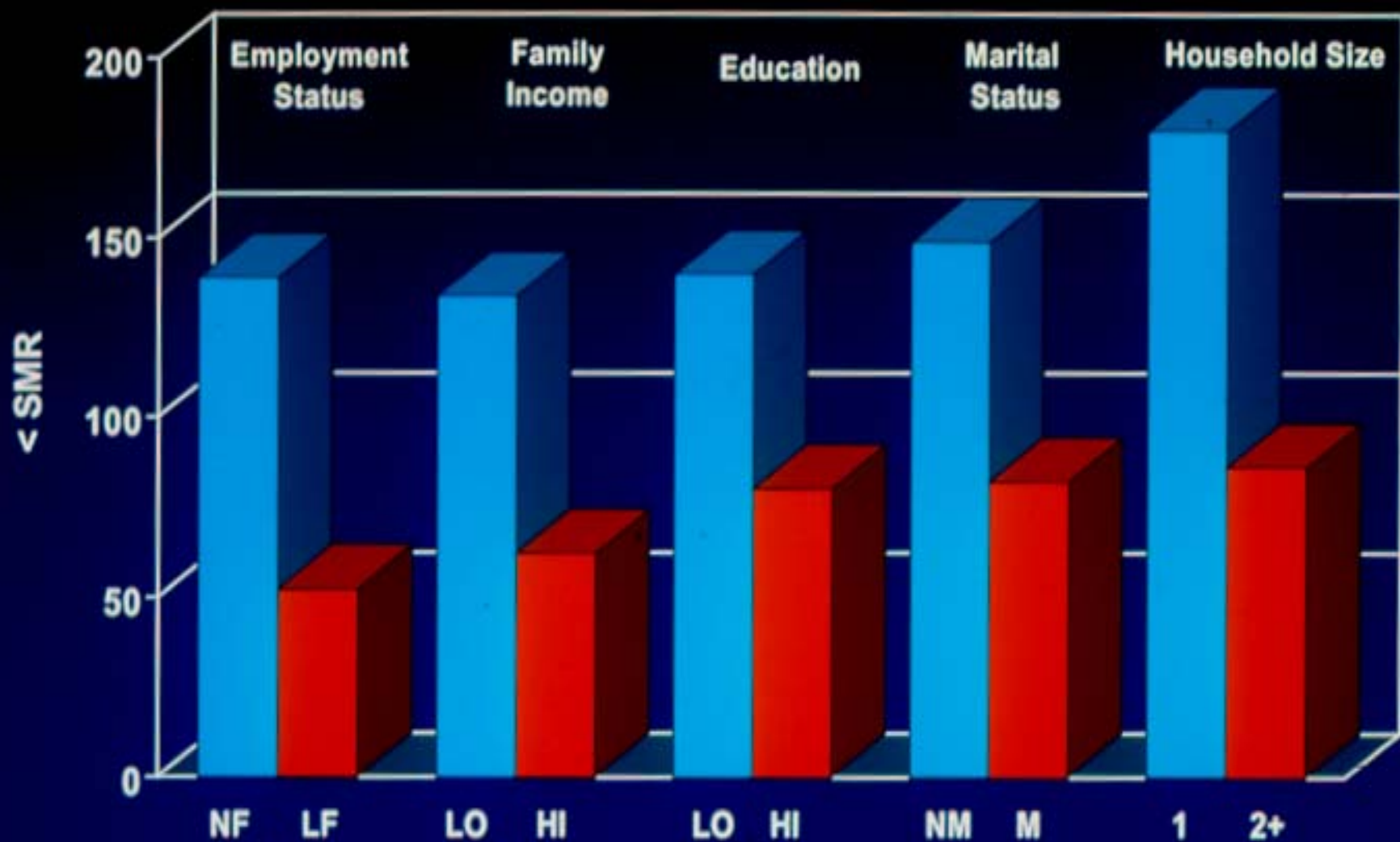
Allen, Matthews, et al. Psychosomatic Medicine 1993

Mean IMT Scores by Quartiles of Pulse Pressure Change during Mirror Tracing Task



Matthews, et al. Stroke 2001.

Cardiovascular Mortality for Selected Social and Economic Factors: White Women 45-64

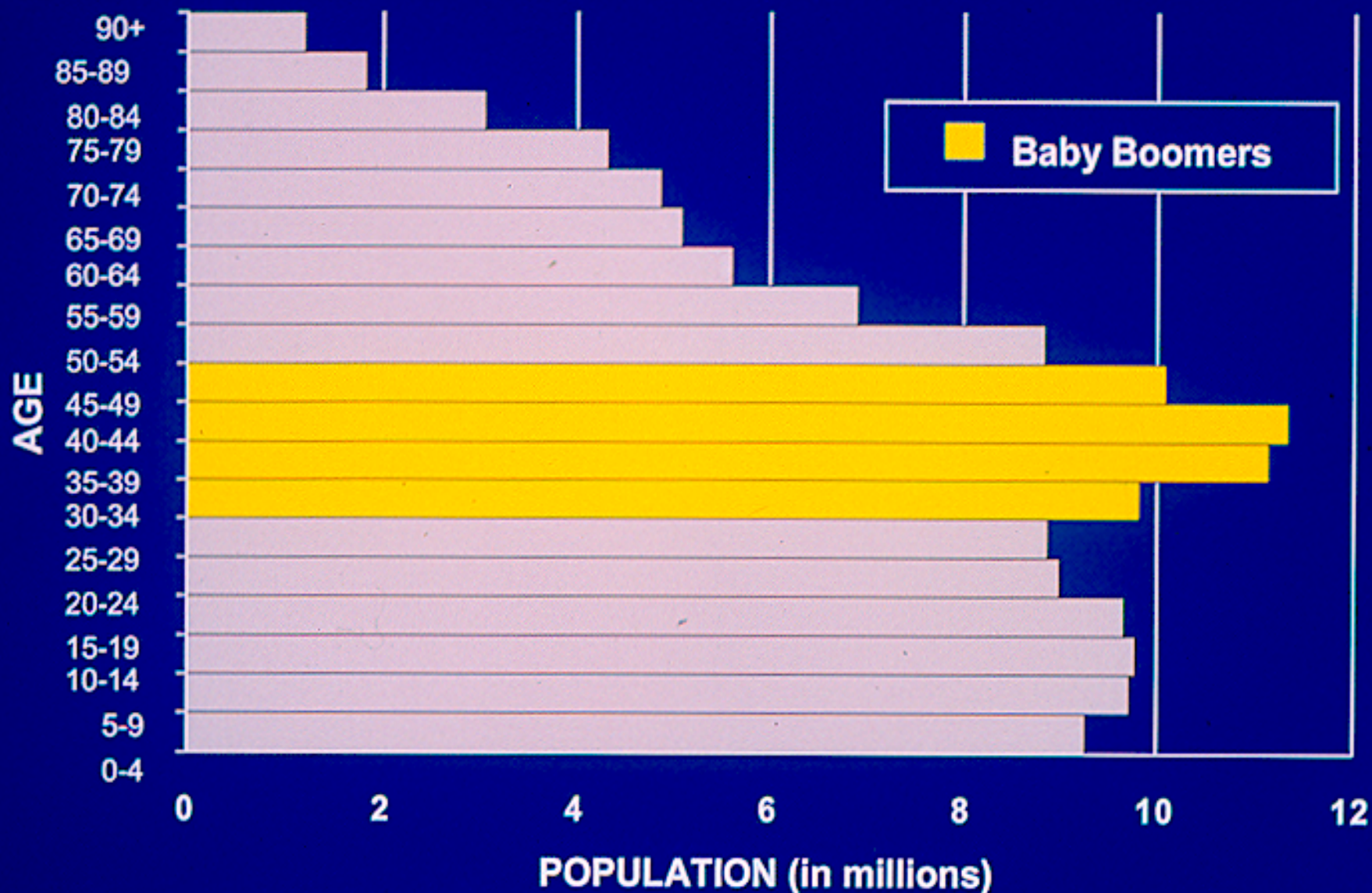


Source: National Longitudinal Mortality Study

Summary

- Some risk factors differ in importance for men and women.
- Should not assume that male risk factors are important for females
- Broaden search for risk factors to attributes that characterize women's lives

Age Distribution of Women in the U.S. in 2000



Source: U.S. Census Bureau, 1992

Let Me Count the Ways Men and Women Differ:

1. Initial diagnosis
2. Symptoms
3. Underlying mechanisms
4. Treatment
5. Prognosis
6. Psychosocial risk factors